

EVOLUTION OF SHIPBUILDING IN SOUTHEASTERN MASSACHUSETTS

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THE present availability of hitherto inaccessible and unexplored sources of information has impelled the authors to begin a detailed geographic survey of the evolution of shipbuilding in New England. The results of the survey will appear in forthcoming issues of *ECONOMIC GEOGRAPHY*.

The authors plan a series of regional and type studies as the best method of presenting, in the light of regional and local environmental factors, the great amount of statistical and descriptive material which they have collected and interpreted. The location of the authors in the heart of the early shipbuilding center of the continent has enabled them to make personal intensive field studies on the sites of the old shipyards.

Hitherto studies have been made from historical, navigational, or descriptive points of view. The authors now present a geographical analysis of the industry.

The casual visitor to the shores of southeastern Massachusetts, viewing the great prosperity of this summer playground, little realizes the development of great industries which formerly flourished in this region. The early settlers here, faced with a rigorous, exacting environment were forced to utilize every available opportunity to supplement the meager living obtained by farming.

One of the chief industrial responses resulted from the favorable marine environment, and the inhospitable aspects of the forested slopes and rocky, sterile soil. The resultant of the two forces, combined with the necessity of keeping in contact with the mother

country and the other colonies, in part stimulated the development of an early shipbuilding industry of notable magnitude.

An occasional historic marker, a decaying pier or launching way, or at most a small boat storage and repair yard, today mark the sites of once flourishing shipyards (Figure 1).

The early need for shipbuilding was based upon the necessity for the colonists to supplement the limited food supply and cash income obtainable from the land. Fishing vessels were required for bay and bank fisheries. In an unsuccessful attempt to start an English fishing colony, the thirty ton "Virginia," was constructed in 1607 at Stage Island in the mouth of the Kennebunk River, Maine. Vessels were also re-



FIGURE 1.—A tablet which marks the site where the "Fox Hill Shipyard" was located in the town of Scituate, Massachusetts, along North River; now a monument to a decadent industry.

quired for the West India and coasting trades. In 1631 the "Blessing of the Bay," the third vessel built in America (Figure 2) was launched on the Mystic River for trade along the New England coast and with the Dutch at New Amsterdam. Constructed for Governor Winthrop, it introduced New England to the West Indian products by way of Holland. Later, it and other vessels made direct voyages to the West Indies. In 1640 the 120 ton "Desire" of Salem brought home cotton, tobacco, negroes from the Bahamas, and salt from Tortugas in exchange for articles mentioned by Governor Winthrop when he said, "... dry fish and strong liquors are the only commodities for those parts." These articles constituted staples of the trade for the next two centuries, a trade which laid the basis of most shipbuilding as a separate industry following 1640.

There were many environmental conditions conducive to the development of shipbuilding of which the colonists early took advantage in order to supply the necessary vessels.

Of the physical factors involved in the establishment of the industry, perhaps the most important single factor was the post-Pleistocene subsidence of the land, which produced a number of physical conditions directly or indirectly significant in the growth of the business. It resulted in the drowning of the mouths of streams entering the sea, forming protected estuaries where ships could be built and launched without fear of wreck. It also formed protected harbors to act as bases for shipping activities of all kinds—fishing, trade, and military. It produced the highly indented coastline which encouraged personal and economic contact with the sea, and provided many harbor islands to serve their age-long function of encouraging navigation. It was a major



FIGURE 2.—Historic marker on the banks of Mystic River, Medford, Massachusetts, commemorating the third vessel to be built in America. The exact spot where its construction took place is not known.

factor in the formation of the fishing banks from Cape Cod to New Foundland, strong incentives to navigable enterprise because of the importance of their "harvest of the sea" to a land characterized by its poverty of soil.

Other factors were of equal importance. Neighboring large areas of mixed forests afforded abundant supplies of timber excellently suited to shipbuilding, and provided the naval stores needed for maintenance and repair of the fleets. Numerous deposits of bog ore in glacial lakes, and nearby potential power sites formed by disarranged drainage allowed iron-making for ship fittings. The tides coming considerable distances up rivers permitted location of shipbuilding sites well up the rivers near the timber supply.

Thus the happy combination of a shipbuilding unit within a river valley, bog ore and sources of streams in the lakes, power sites for forges along the upper courses, and building sites along the lower courses and estuaries. Adjacent glacial slopes provided forest containing abundance of oak and pine for hulls and masts.

Soon after establishment as a separate

industry along the Atlantic coast, shipbuilding underwent a process of segregation which led to concentration of the industry into the most favored areas. One such center was southeastern Massachusetts. Shipbuilding in this area was mainly confined to centers at Scituate Harbor, North River, Blue Fish River-Duxbury Bay area, Jones

River, and Plymouth Bay. (See Figure 3.) Plymouth was the first of these places to begin building. In 1624 the Pilgrims brought over a ship carpenter who built two shallops and a lighter, and had timber for two ketches when he died of fever. They early recognized the importance of a strong shipbuilding industry by passing a law which required

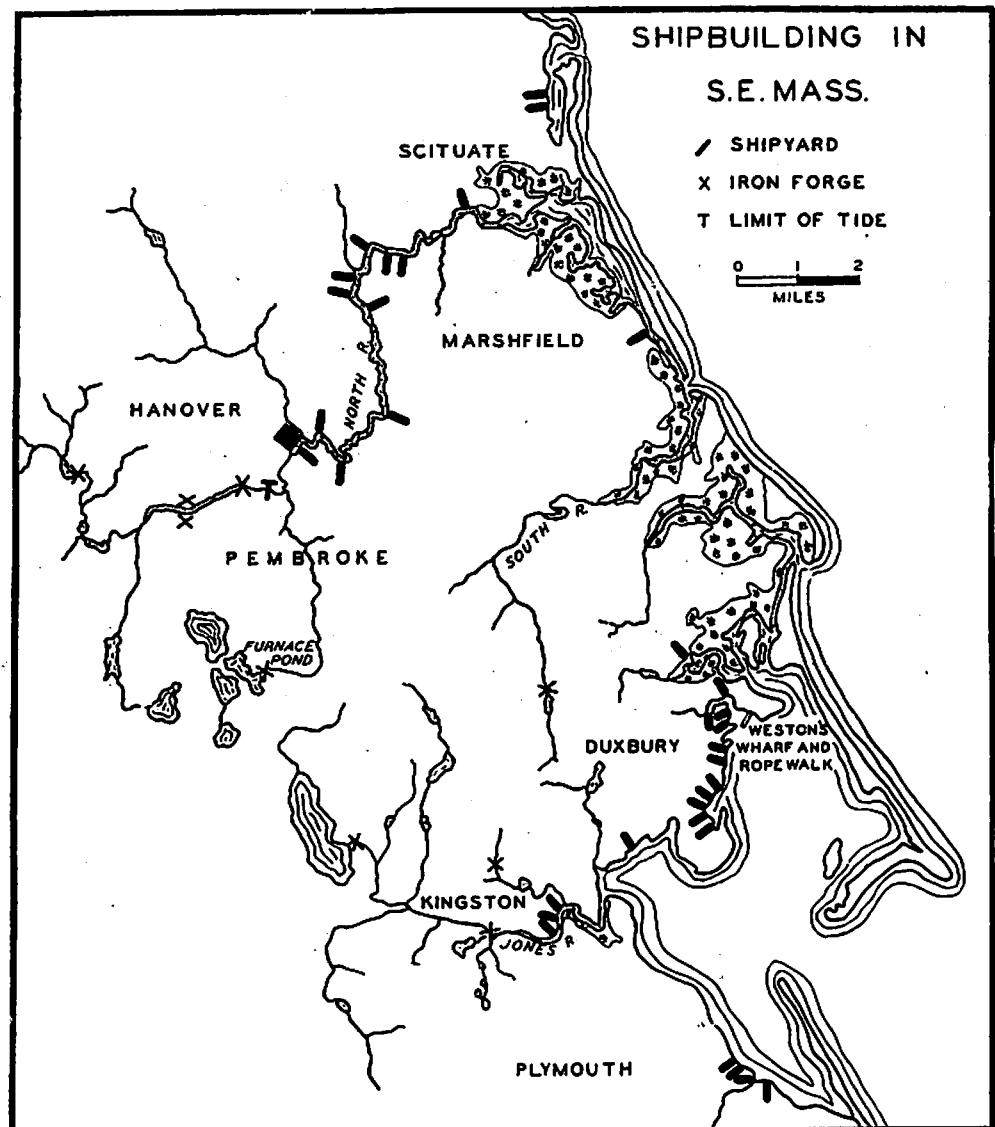


FIGURE 3.—Shipyards in southeastern Massachusetts were grouped about the most favored building sites; meanders of tidal streams such as at Jones and North rivers, and on protected bays, as Scituate, Duxbury, and Plymouth. The up-river ponds furnished bog ore, and downstream from the ponds, forges were located at convenient power sites.

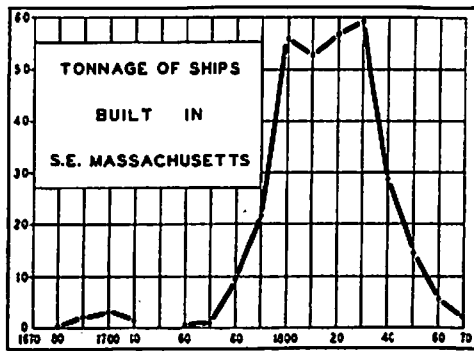


FIGURE 4.—Tonnage of vessels constructed in southeastern Massachusetts in thousands of tons, by decades. During the period from 1790 to 1840, the "heyday" of the American Merchant Marine, approximately 250,000 tons were built.

of builders that "nothing should be amiss in materials or workmanship." By 1633 settlement was made at Scituate, based upon an important fisheries there. Without doubt, shipbuilding was started shortly after, but the first recorded vessel appears in the Massachusetts State Archives as being built in 1678. By 1678 the industry had also spread to North River, where at the Briggs yard a brigantine of thirty tons was constructed. Although local Duxbury records reveal shipbuilding as beginning about 1719, the State Archives records show that a vessel of 35 tons was built there as early as 1703. Previous to 1714 a shipyard was located at Kingston, but no records of ships built there are found prior to 1727; when a 41-ton sloop was made there.

Utilizing the physical advantages before mentioned, the industry expanded in the area until it reached a peak of development, building approximately 224,456 tons of vessels during the forty years between 1800 and 1840. Early records up to 1714 show that the industry was rapidly increasing; following that year few records are available until 1789 when the United States Customs Houses kept records. (From "Narrative History of the Town of

Cohasset, Mass." written in 1898 by E. V. Bigelow, we learn that, "All the records previous to the year 1776 were confiscated and taken to Halifax, Nova Scotia, when the British evacuated Boston, and were thrown into a damp cellar. Nearly seventy-five years later, when some accommodating Halifax officials searched them out . . . they were so rotten and rat eaten as to be utterly useless." Because of the paucity of accurate records for the period 1714 to 1789, any analysis of the trends during that time must be based upon the estimates made by early colonial officials.) However the business in Massachusetts apparently increased for a time, reaching a peak around 1769, then declining just before and during the Revolutionary War. So many shipwrights were attracted from England by special inducements that the builders of London complained to the Lords of Trade in 1724 and 1725 that " . . . the New England trade has drawn over so many working shipwrights that there are not enough left here in London to carry on the work."

The Journal of the House of Commons for 1769 shows that 389 vessels were built in the Colonies that year.

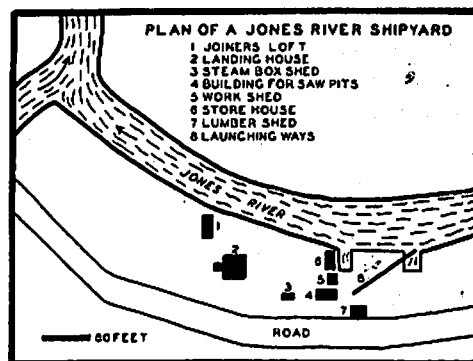


FIGURE 5.—Plan of a Holmes shipyard, one of the leading yards at the "Landing" on Jones River, Kingston. Note position of the launching ways to permit launching of vessels upstream when they were no longer than the width of the stream.

The same year Lord Sheffield estimated that Massachusetts Bay built 137 vessels totaling 8,013 tons, about 60 per cent of the tonnage launched on the entire Atlantic coast that year.

Foreign orders for vessels filled at Boston alone averaged about 40 per year from 1735 to 1738. For the next few years the orders were distributed as follows:

1738.....41	1746.....20
1743.....30	1749.....15

The decline is partly due to the gradual enforcement of the navigation laws.

Before the Revolution, 125 vessels were built in the colonies each year. Just after the war, shipbuilding virtually came to a standstill. From 1784 to 1785, 45 vessels were built; between 1785 to 1787, about 15 to 20 per year.

Following the period of privation and sacrifice necessitated by the war, efforts were directed toward the reestablishment of disrupted American trade. The vessels required by the renewed commerce accounts for the rapid rise

in construction between 1789 and 1840 (Figure 4). By 1826, 92.5 per cent of American commerce (imports and exports) was carried in American owned vessels. During the period between 1800 and 1840 over two-thirds of all the vessels ever built in the area were constructed. The temporary decline during the decade from 1810 to 1819 was occasioned by the War of 1812 which so paralyzed shipping in all New England that in 1814 only 54.5 per cent of American commerce was carried in American vessels. After 1814 shipbuilding rapidly recovered, reaching its greatest development during the decade 1830 to 1839 when nearly 60,000 tons of ships were constructed.

FACTORS CONTROLLING EVOLUTION OF THE INDUSTRY

The first factor controlling the shipbuilding industry was location. Locations of shipbuilding sites may be grouped into three types:

1. Location on banks of the lower



FIGURE 6.—Building sites at the "Landing" on Jones River, today occupied by boat building and storage firms. The broad flats provide an excellent site for the buildings and launching ways. The remains of a channel lead to the river at the right of the first building. Such ditches were dug from deep water to the building stocks.



FIGURE 7.—Ruins of a shipyard at the break in the farther bank of North River. This is an excellent illustration of location on an area of flat, marsh-free land.

courses of rivers within reach of tide. This was the preferred and most common location, including a total of 18 sites in which there were 30 yards located on North river and Jones river. This type is further illustrated by the building sites on Jones river, which were located about one mile from the mouth of the river, where the tide rises from 8 to 12 feet, providing water enough to launch a ship of 400 tons (Figures 5 and 6). In the early period while ships were small this location was advantageous. It became also an important factor in the decline of river sites as the demand for ships exceeding 400 tons became common. Another factor affecting choice of sites was flat areas free from marsh, and large enough for the construction of ships (Figures 3 and 7).

2. Location on protected bays and coves formed by river estuaries. This type, of which 19 have been located, offered opportunity for locating larger yards where bigger and greater numbers of vessels could be constructed at one

time, thus making for a larger tonnage per yard. The largest vessel built at Duxbury Bay was a bark, the "Thomas Goddard," of 715 tons, 154 feet long and approximately 35 feet broad and 13 feet deep. Here direct contact with the sea allowed both coastwise and foreign shipping to supplement the vanishing local materials (Figure 8).

3. Inland location. One yard at Duxbury was separated from the bay by the main highway, across which it was necessary to build ways, thus blocking all traffic at times of launchings. At peaks of demand for building sites at Duxbury, one yard was actually located a mile inland, from which it was necessary to use 100 yoke of oxen to haul vessels to the bay for launching!

The second controlling factor was the changing sources of materials. The mixed forest within the area at first provided a variety of woods for use in shipbuilding. Oak for planking and pine and hemlock for masts and spars proved superior to all other woods, so

these were soon used almost exclusively by ship carpenters. A great abundance of such timber was readily available in early times, but as the stock became depleted it was necessary to draw upon more distant sources. About 1815 supplies of timber adjacent to the yards were near exhaustion, especially trees of proper shape for the making of ships' "knees." It was necessary for a certain builder to purchase an entire woodlot, located some twenty miles inland, in order to get a single tree suitable for the forming of "knees." With the virtual exhaustion of local timber it became imperative to import it from forests of the southern states and Maine and southern New Hampshire. East Boston made and finished masts and

spars for the builders of this area, and masts were freighted by coastwise schooners to wharves along the coast where they were "stepped" into ships. Mounting cost of ship timber coincident with increasing remoteness of supply became a contributing, but never a decisive, factor in the decline of the industry here.

Due to the difficulty and expense of obtaining iron, builders substituted wood for fastenings wherever possible. Planks were fastened by white oak pins called tree nails or "Trunnels." Such iron bolts and fittings as were needed were made from bog ore obtained locally. Forges were located in favorable spots for obtaining ore and water power (Figure 3). With the increasing number

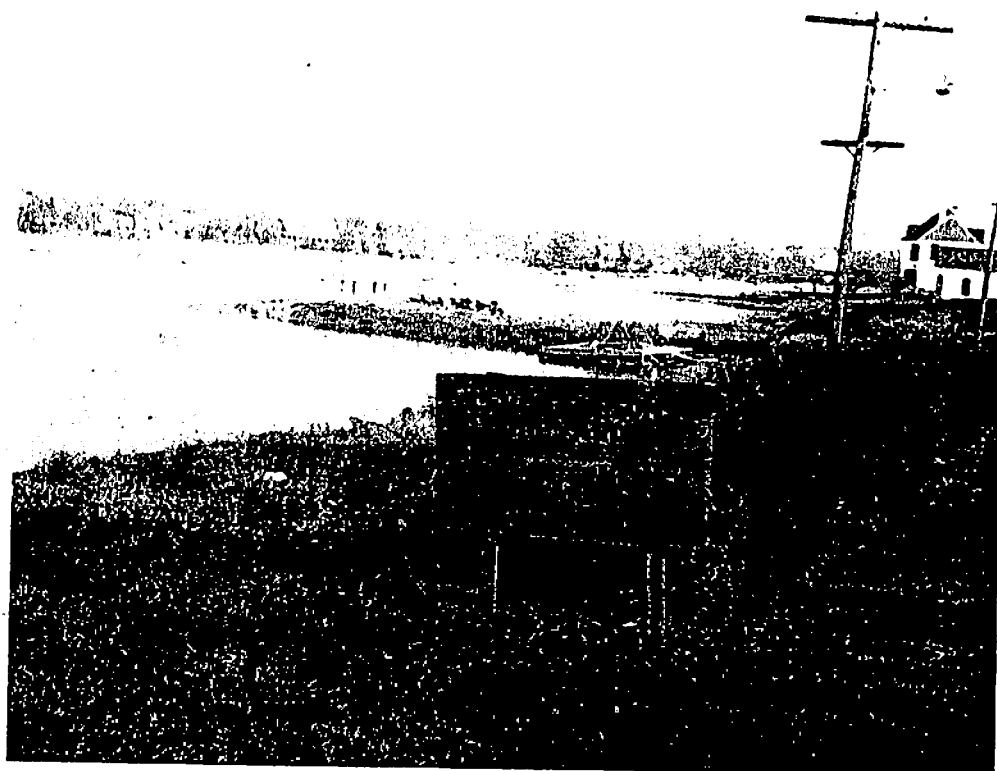


FIGURE 8.—Location of Sampson's shipyard, later Keene's yard at Duxbury on the Blue Fish River estuary. This type of location allowed the building of larger ships than was possible in the up-river yards.

of ships built and failure of the local ore, it became necessary to turn to foreign sources for iron. The foreign iron was obtained as part of the return cargo for vessels leaving Spain, England, Russia, and Sweden. Swedish iron largely replaced local bog ore in Plymouth County, being a staple article of import until 1860.

For the entire life of the industry, builders relied upon foreign sources of hemp, duck, and canvas used in rigging the vessels. Hemp was largely imported from two sources, Russia for the poorer grades, Manila for the best. Russian hemp rope was used in places where a steady strain required strength but little elasticity, while Manila was utilized where elasticity was at a premium. Canvas and duck for sails were imported from St. Petersburg, Russia, and a little from other Baltic ports.

The local forests furnished sufficient naval stores to meet the demands of the early industry; however it soon proved imperative to look to the southern pine forests for these materials.

RISE OF THE INDUSTRY

The prosperity of the shipyards and the consequent rise of the industry was largely determined by two sources of demand for ships. The most important was sale or lease of ships to merchants outside the producing area; but of nearly equal importance was the employment of ships by the builders in fishing and trade. Ezra Weston of Duxbury, one of the leading merchants of his time, and said to be the largest ship owner in America in 1840, built and owned all the vessels employed in his trading ventures (Figure 9). Joseph Holmes, the most important builder of Kingston, referring to vessels built by him, said in 1859, "All but two I have fitted for sea and sent to sea on my own account

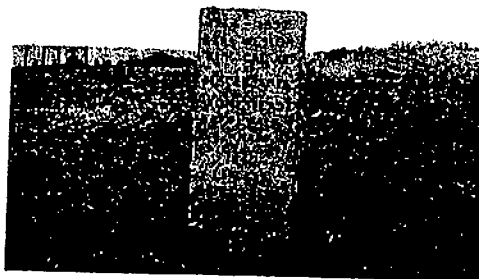


FIGURE 9.—Site of the wharf and ropewalk of Ezra Weston, Duxbury's leading merchant and ship owner. Mr. Weston's ships were outfitted here and sailed to all parts of the globe.

and risk." Although the map (Figure 10) shows a world wide distribution of ports of call for the Holmes vessels, the heaviest concentrations are in the Mediterranean, Caribbean, Atlantic and Gulf ports, and the northwestern European ports.

Demand for ships presented by these two outlets was controlled by conditions prevalent in travel and trade. Lack of a good highway system forced all inter-colonial traffic to be sea-borne. Trade with the West Indies, the Mediterranean, and Northwest Europe and Southeastern Asia, as well as the coasting trade, was expanding rapidly, creating tremendous demand for vessels of all rigs and sizes. Practically all ships built in the area entered one or more of these trades.

The principal commodities carried in vessels sailing to the Mediterranean were: dry salted codfish, sugar, and barrel staves. The staves were left at the principal wine ports. On the return trip the ships called at various ports making up their general cargoes of Mediterranean products, consisting of dried fruits, citrus fruits, wine, salt, sulphur, marble, and other specialized products of the region. The Boston market placed a premium upon the first ship to arrive with each new crop of

citrus fruits, which sometimes amounted to a differential as high as \$10,000. This great demand for speed in the Atlantic crossing lead to yearly races between the ships engaged in the Mediterranean fruit trade. These efforts to be first to deliver cargo in Boston caused the captains to crowd on so much sail that sudden storms often resulted in the ships being "run under the waves." Of

with New England products or in ballast, where they obtained cotton, tobacco, lumber, or sugar from the West Indies, to be exchanged in England or the continent for coal, iron, nails, canvas, duck, Russian hemp (*Cannabis sativa L.*), and manufactured goods. Around 1832 Plymouth was the point of import for bar iron which served the 26 establishments engaged in iron manufacture in Plym-

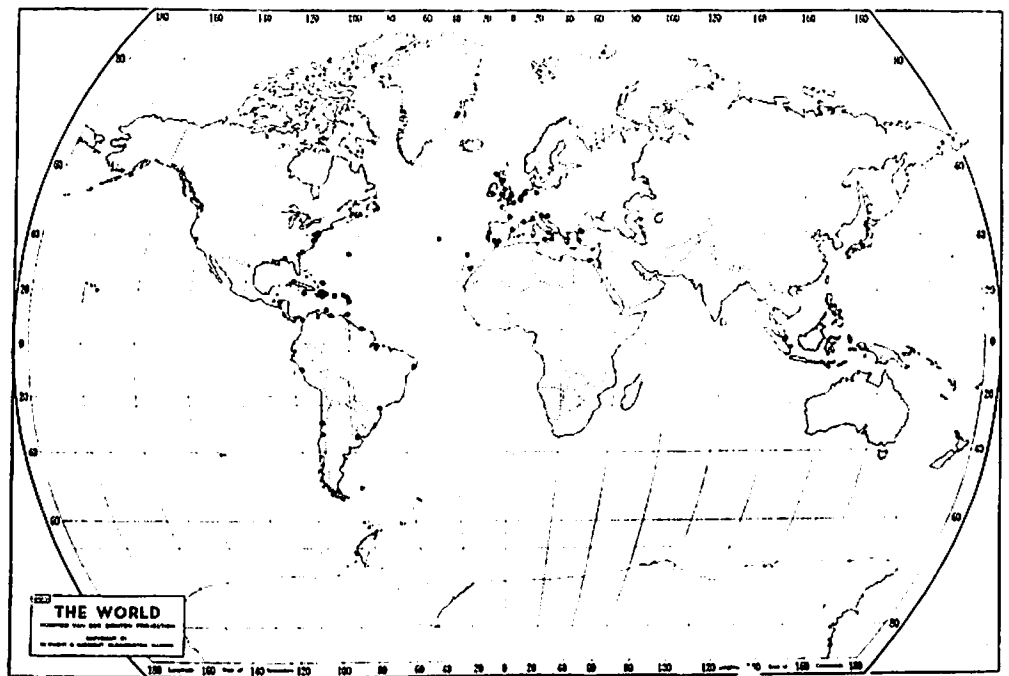


FIGURE 10.—Ports of call of the Holmes vessels out of Kingston, illustrating the principal areas of trade of southeastern Massachusetts. The vessels participated in the lucrative "triangular trade" between New England, the Caribbean, and western Europe.

the Holmes vessels engaged in the trade, four were lost in this manner.

Among the limited number of commodities in the Caribbean trade were dried, salted, and refuse fish, and following 1840, ice. The return cargo consisted of salt, sugar, molasses, a few slaves, and some fruits.

A triangular trade existed between Massachusetts, the Atlantic and Gulf ports, the West Indies, and northwestern Europe. Ships went to southern ports

outh County. In 1803 the foreign trade of the Plymouth Customs District was carried by 17 ships, 16 brigs, and 40 schooners. The duties paid on the cargoes were about \$100,000.

Fishing was long a highly important occupation in most seaboard towns. Many of the vessels built here entered that trade in the summer and made about three trips to the banks between March and November, then went on trading voyages, called "freighting voy-

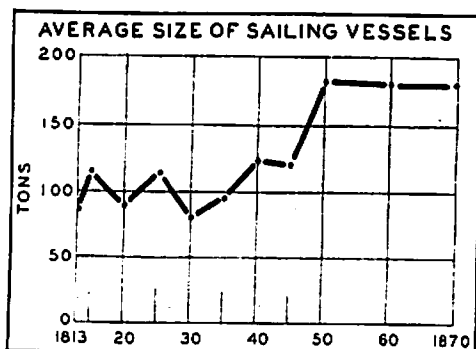


FIGURE 11.—Shipbuilding rose to its peak in the period when sailing vessels averaged about 100 tons. The industry declined precipitously after 1840 when vessels increased in size beyond the limit of the yards' maximum.

ages," south in the winter. The ships brought home corn, flour, coal, and lumber, timing their arrival to coincide with the outfitting season for the banks fisheries. This continuous employment which produced a steady income for the ship owner and builder, was a factor of considerable importance in the demand for vessels.

During the colonial period and the early years of the United States, while maritime interests were dominant, many protective laws were passed favoring the owners, builders, and merchants. As early as 1641 the General Court of the Massachusetts Bay Colony passed a law as follows: "Whereas the country is now in hand with the building of ships, which is a business of great importance for the common good, and therefore suitable care is to be taken that it be well performed; it is therefore ordered that when any ship is to be built within this jurisdiction it shall be lawful for the owners to appoint and put in some able man to survey the work and workmen from time to time, to see that it be performed and carried on according to the rules of their art." The first of the English Navigation Laws were actually helpful to the colonies. An act in 1650 provided that nothing produced in Asia,

Africa, or America should be imported into any part of the British Empire except in English ships. This law succeeded in eliminating the Dutch from competition in the American trade. It aided building in America until 1663 when more adverse laws were passed.

During Washington's and Adams' administrations, government measures were especially helpful. Duties on all imports were very low, being tariffs "for revenue only." Preferential rates were granted American vessels in proportion to the distance from which they brought goods to the country. Tariffs were returned on all goods re-exported within one year of importation. In 1791 the bonded warehouse system was established by Hamilton. It allowed tea duties to be paid any time within two years of importation, thus giving the merchants a chance to sell their tea before the tax fell due. In 1795 this system was extended to other products from Europe and the West Indies. In 1790 a port fee of 50 cents per ton was levied on all foreign vessels. American vessels paid only 6 cents per ton, and those in the coasting trade paid this fee only once a year, while foreign ships paid it in every port of entry. In 1785

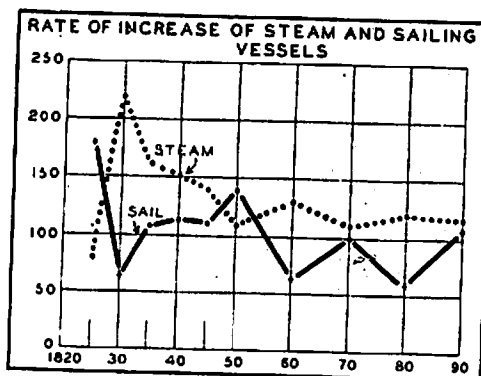


FIGURE 12.—Comparative rates of increase of steam and sailing vessels in per cent, 1825-1890. The advent of the iron steamer sounded the death knell of the wooden sailing ship, an effect which was first felt in southern New England.

Congress levied duties for the purpose of encouraging shipbuilding based upon the use of American materials only. Six cents per gallon was paid on rum imported in foreign vessels, and 7s, 6d per ton on every vessel entering from a foreign country. Specific countries which had reciprocal trade treaties with the United States were excepted. Ready-made sails paid a ten per cent duty, blocks and sheaves $7\frac{1}{2}$ per cent. All tea imported from Europe paid from 6d to 2d per pound, depending upon quality. This had the effect of establishing a direct trade with Asia, as direct importations were duty free.

DECLINE OF SHIPBUILDING

Following the peak of development reached in 1840, two classes of factors were responsible for the decline of building in this region. The first group may be classed as local. Perhaps the most

important single factor militating against the industry was the steadily increasing size of American sailing vessels (Figure 11). Throughout the district the maximum size of vessels which could be economically built and launched was well under 500 tons. Although it was possible to build somewhat larger vessels, it became increasingly expensive to build, launch, and get them to sea. At North River it cost \$1000 to get the 390 ton "Hilo" to sea from one of the yards up river. The largest ship ever built on the river was only 464 tons. Another contributing condition was the exhaustion of the local timber supply. At first the failing local supplies could be supplemented by oak from the surrounding towns which were within reasonable hauling distance, but when it became necessary to import lumber from more distant sources, it was economically impossible to compete with more favorably located builders.



FIGURE 13.—The townspeople along North River, proud of their former great industry, have erected markers at the sites of the old yards. Such a marker here clearly shows excellent locational advantages on a meander.

Thus the area was replaced in prominence by the Boston Bay region which had better access to raw materials and deeper water. The northward migration of the industry was materially aided by the builders themselves, many of whom left southeastern Massachusetts, and started new yards at Medford and Boston.

Another factor of local importance was the removal of the fishing bounty which had formerly stimulated the Plymouth Bay fishing fleets, and had indirectly provided a demand for fishing craft. Steady concentration of fishing interests at Gloucester and Provincetown further affected the industry.

Besides such local conditions adversely affecting the industry, a complex of regional and national factors indirectly undermined the structure of the building business. Some chief factors may be briefly mentioned. The industrial revo-

lution in New England was financed largely by transferred maritime capital. C. F. Jones states that it was the most important single source of early industrial capital. Even when industry became well established, the opening of the west by railroads attracted both labor and capital that otherwise would have been available to maritime interests. Two financial panics, one in 1837, the other in 1857 took considerable toll of shipbuilding firms, many of whom never were able to resume operations. Competition of steam with sail was a factor of considerable consequence in the decline of wooden sailing vessels. The chart (Figure 12) shows that following 1830, steam driven ships increased in number at a faster rate than sailing ships. The single exception was the year 1850 when the demand for all types of vessels rose unusually high.

The decline of the carrying trade of



FIGURE 14.—This picture, taken about 1890, shows the last vestiges of the five forges formerly located in Hanover on the upper reaches of North River.

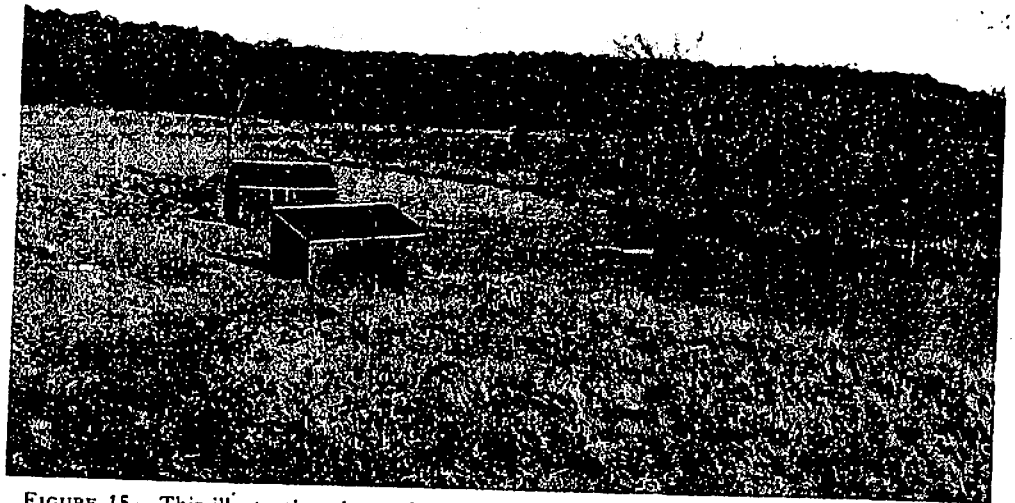


FIGURE 15.—This illustration shows the location of numerous yards at a point at North River below the bridge shown in Figure 16, combining the essential requirements mentioned in the text.

the United States had disastrously affected shipbuilding. Until 1830, an average of about 90 per cent of the foreign trade of the country was carried in American-built vessels. In 1879 the figure had dropped to 23 per cent. Reciprocity treaties with Britain proved ruinous to American maritime interests. Prior to 1831 an average of only 76,500 tons of English ships entered American ports each year. The average for the decade 1831 to 1840 was 212,600 tons per year, an increase of 278 per cent. By 1849 British vessels could enter any port in the United States on absolutely equal terms with American vessels. With decline of the foreign carrying trade, American ships retreated to the heavily protected coastwise trade, but here again, they lost business steadily to the rapidly expanding eastern railroad networks. Later, with completion of the transcontinental lines, the lucrative California and west coast trade was largely lost.

The cumulative effect of these factors was the precipitous decline of shipbuilding in southeastern Massachusetts (Figure 4), and an exodus of part of the

building population to more northerly centers which were being established. Thus is epitomized the beginning, rise, and decline of one of the significant industries of early southeastern Massachusetts, an industry which formed the foundation for the essential economic activities of the region.

SHIPBUILDING ON NORTH RIVER: A TYPE STUDY

The most intensively developed center in this region was North River, of which the valley was a virtually self-contained shipbuilding unit. In this basin the industry grew and prospered. The workmen became so skilled that, with the decline of the river yards, the valley became a center of dispersion for ship carpenters who emigrated and established some of the leading shipyards of the later periods in northern Massachusetts.

Shipbuilding on North River was materially aided by some of the natural characteristics of the valley. The meanders of the stream in its lower course provided excellent sites for yards

(Figure 13). Because the river was narrow, it was necessary to locate the yards on the curves of the meanders, facing either up or down stream so that in launching ships they would not be damaged by striking the opposite bank. The average tide penetrated more than six miles upstream, and gave opportunity for the construction of much larger vessels than would be possible without such tidal rise of several feet (Figure 3). The sources of the river are in glacial lakes in which a good grade of bog ore was found, and the upper courses had sufficient gradient for the establishment of power sites for forges and lumber mills. Because of the availability of both ore and power, numerous forges were located within the drainage basin of the North River (Figure 3). Most of the enterprises manufactured anchors for the vessels built on the river; some anchors were even sold in Boston and Salem. The anchors for the famous frigate "Constitution" were made here. The first forge was established in 1702 at Furnace Pond (Figure 3), while the last one to be in operation went out of business about 1880 (Figure 14). Besides anchors, the forges supplied iron "knees"

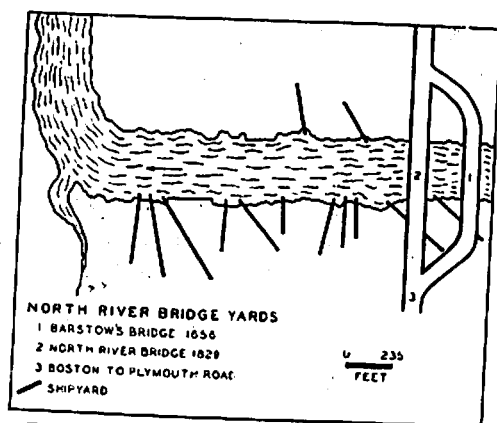


FIGURE 16.—This map shows the densest concentration of shipyards in southeastern Massachusetts. There were twelve firms and thirteen yards located in this limited area.



FIGURE 17.—The old Boston-Plymouth road passing over North River Bridge. Building sites were on the downstream side of the bridge. Supplies were brought over this road from Boston and Plymouth.

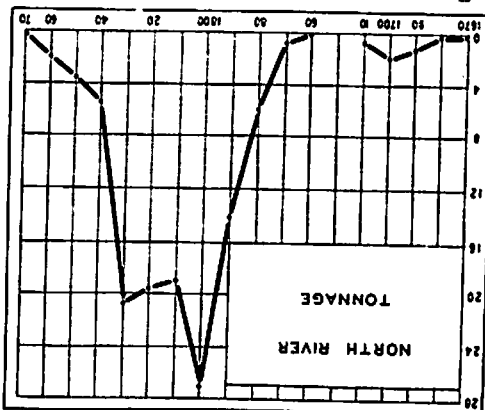
and ship fittings to the builders. They were mostly small affairs, the largest made an average of 250 tons of anchors per year, ranging in size from one-half to two tons. Sixteen men were normally employed. During the Revolution and the War of 1812 most of them turned to the more profitable manufacture of cannon.

The North River basin was unusually well supplied with white oak, so much so, that in some cases vessels were constructed entirely of the heartwood. In colonial New England, oak was the standby of the shipbuilding industry. The old records show few examples of the early builders here complaining of a paucity of local timber, and lumber shortage was not a significant factor in the decline of the river yards until the later stages, when they were already doomed by other conditions. With the development of the business between 1800 and 1840, it proved necessary to import wood, but imports were kept at a minimum.

Materials other than lumber and iron were usually imported in finished or semi-finished form. Rope rigging was always obtainable in Boston, but after 1824 it was available in nearby Plymouth, where the Plymouth Cordage Company was established, a business still

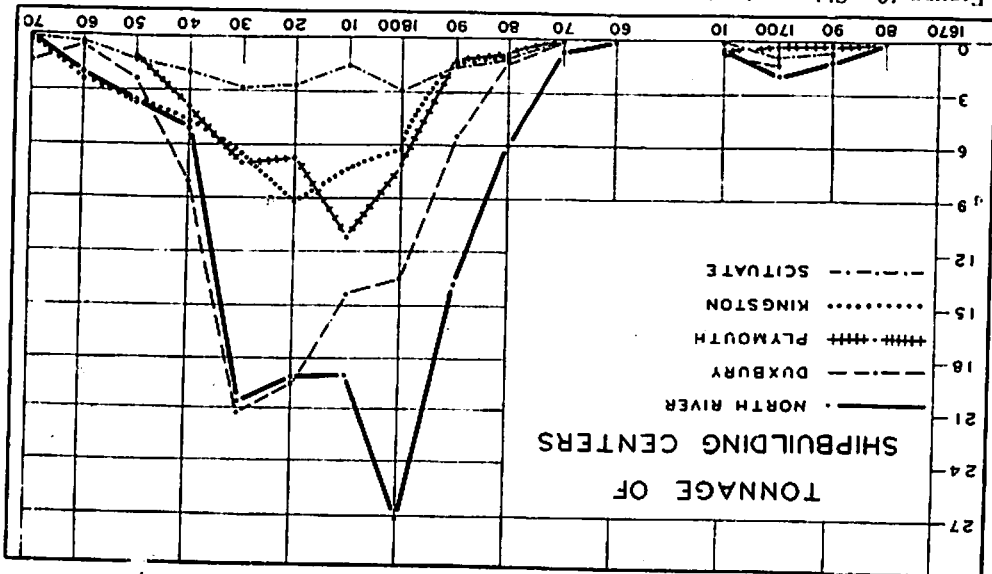
than the one that built the ship. Some of the iron and other metallic fittings were also imported from Boston. Shipbuilding yards were extremely simple in organization and equipment. A piece of level land free from marsh, bordering on deep water, a place to pile lumber, and one or two rough sheds in which to keep plans, and perishable materials and tools completed the essentials (Figure 15). Except for derricks and large heavy implements, the workers were expected to furnish their own tools. By reason of such simplicity of requirements, the yards had no difficulty in finding adequate accommodations on the meanders along the six miles of the river to which the tide penetrated. Of the total of thirty yards on the river, a concentration of twelve firms was located on the downstream side of the old North River Bridge, over which the Boston to Plymouth road passed (Figures 16 and 17). The reason for the premium put upon this area was that supplies coming

FIGURE 18.—Production of vessels on North River in thousands of tons by decades. North River had a sharply defined peak of activity, building 26,000 tons of ships during the decade 1790-1800.



almost always was done by a firm other apart from the actual building, and of the industry was usually considered each ship's specifications. This phase usually bought completely made to plants of its kind. Canvas sails were in operation today, and one of the largest

FIGURE 19.—Ship production of the various building centers in southeastern Massachusetts in thousands of tons. There was a migration within the area, of the peak of activity, the chief centers arriving at their peak in the following order: North River, Plymouth, Kingston, and Duxbury. Access to the open ocean at Duxbury permitted it to reach its peak at a later date than the other centers. The inland location of the North River yards forced the peak of production to be reached earlier than any of the other centers.



from Boston travelled over this road by wagons. As no ships could navigate the river, these yards received supplies most easily, roads to the other sites being little more than rough trails.

Largely on the basis of these natural advantages, the river yards grew and prospered. As will be pointed out, they also declined because of factors inherent in the natural environment. Although building began as early as 1678, and did not entirely cease until 1879, the period of significant activity in which North River was one of the major pro-

ducers of New England was between 1790 and 1850 (Figure 18).

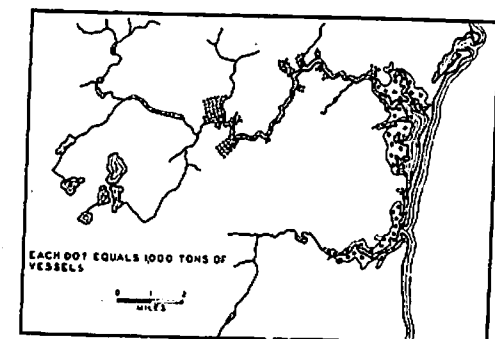


FIGURE 20.—Distribution of North River tonnage built during the entire life of the industry. Note the concentration of dots far upstream, attesting to the productiveness of the yards grouped near the North River Bridge.

Considered from the viewpoint of total tonnage, and number of vessels, the river was the largest builder of ships in southeastern Massachusetts, the all-time figure being over 122,936 tons. Duxbury was next with 88,937. The peak of production was reached in the decade 1800 to 1809 when 27,190 tons of ships were built (Figure 19).

Although important building sites were located at many points on the river, the area of heaviest production was at the North River Bridge in the town of Hanover, where a total of 33,887 tons of vessels was built, over one-quarter of the total tonnage for all the sites along the river. The map (Figure

20) shows the relative amount and distribution of production. Practically all North River vessels were constructed for three main markets. Boston and Salem merchants employed them in the European, Asiatic, and coasting trades. Nantucket and New Bedford whalers used them in large numbers. Massachusetts fishermen employed them in the banks fisheries.

In 1773 James Briggs constructed the famous ship "Columbia" of 212 tons in his yard (Figure 21). This vessel was the first American ship to circumnavigate the globe, and, of more importance, it discovered and explored the Columbia River. The little vessel entered the river in September, 1791, and remained until May, 1792 during which time the crew built a fort and a small boat. It is this event that formed a significant part of the bases for the American claims to the Oregon territory.

The most efficient vessel constructed by the builders was a ship or brig of between 200 and 350 tons; this size range predominated throughout the period of greatest activity. It cost about one dollar per ton to get such a ship out to sea, but the cost rose rapidly beyond this upper limit, thus severely limiting the size of vessels it was economically possible to build here.

Without doubt the most important factor in the decline of the river yards was the increase in size of ships demanded by the merchants in the 19th century era of expanding trade (Figure 11). The process of getting a ship from one of the up-river yards to the sea was often quite complicated and expensive. Launching was always at high tide. Then, with numerous empty barrels lashed at low tide to the hull for buoyancy, and with two guy-ropes to each bank to keep the vessel in the narrow channel, it was towed downstream to the mouth. Once there, the

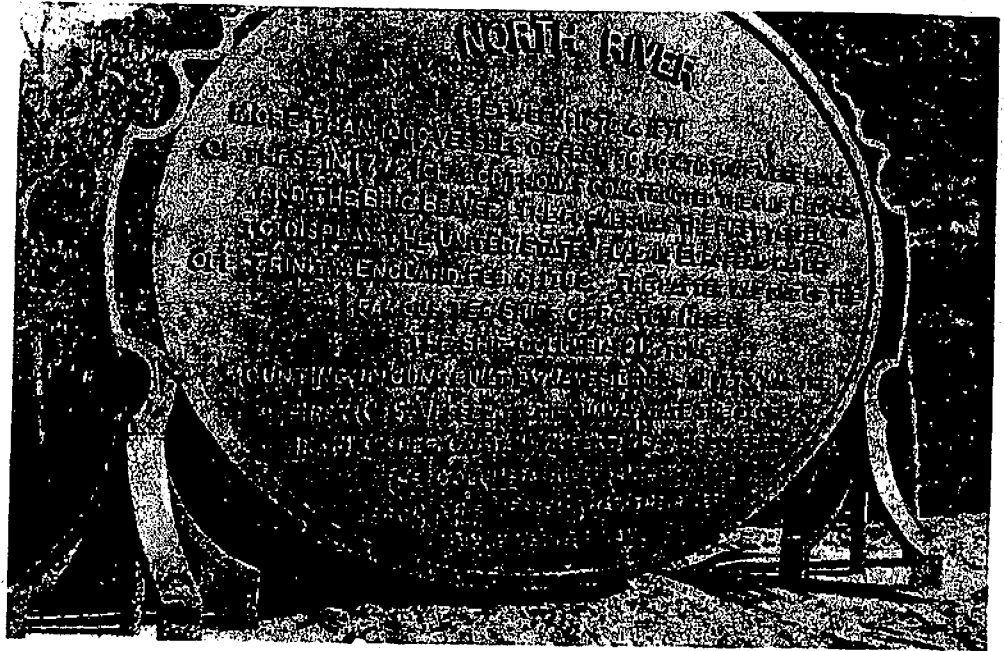


FIGURE 21.—This marker is a reminder of the old "Yankee enterprise" which expressed itself in the development of a great shipbuilding industry. Yankee ships established American trade in ports throughout the world, and were an important factor in the establishment of American territorial claims on the west coast and in the Pacific.

problem became really serious, for the bar effectively blocked the way to the sea (Figure 3). To get the larger ones to deep water, it was necessary at low tide to dig a deep ditch through the bar, then on the tidal flat beyond the bar, to bury large planks five to six feet deep in the sand, to which heavy chains were fastened. The chains were then attached to the windlass of the ship, and scows were lashed under the bow and stern to give added buoyancy. Now with as many as fifteen men straining on the windlass, aided by one or more high tides, the vessel would be half dragged, half floated over the bar. This process was called "kedging," and the details of its operation give an excellent example of some of the difficulties under which the industry was carried on, and how strictly the size of North River vessels was limited. It also explains why no ship ever returned after once passing over the obstruction.

As competition increased, the chances for the survival of the river yards obviously depended upon the removal of the bar. The builders realized this: in 1841 they made an attempt to have the national government dredge a channel through the bar. John Quincy Adams, then a member of Congress was shown the shipbuilders' proposal; inspected the river, and declared himself favorably impressed. Nothing ever came of the project, and the industry here was doomed. It had begun, expanded, flourished for a time as it realized the maximum benefits of its natural environment, and then, with the economic requirements changing, the inherent disadvantages became effective, and the industry disappeared. Today, a lone boat-repair and storage yard at the site of the old Brick Kiln yard is the only reminder of the once flourishing industry of shipbuilding on North River.